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## Two New Winged Species of *Symbolanthus* (Gentianaceae: Helieae) from Colombia

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**ABSTRACT.** Two new Colombian species were identified in the Neotropical genus *Symbolanthus* (Gentianaceae: Helieae) during an ongoing revisionary study. *Symbolanthus pterocalyx* Struwe is characterized by its green to yellow corollas, strongly winged stems, and long-acuminate calyx lobes with a long, thin dorsal keel on each lobe. The other new species, *Symbolanthus tetrapterus* Struwe, also has strongly winged stems, but corollas variously colored in green, white, pink, to red-violet and calyx lobes rounded and non-keeled. Both species are endemic to small areas in the Andes of western Colombia. The western outlier Cerro del Torrá of the Cordillera Occidental in the province of Chocó (Colombia) is the only known locality of *Symbolanthus tetrapterus*. *Symbolanthus pterocalyx* occurs in high-elevation cloud forests, subpáramo, and páramo in a small area around Medellín in the province of Antioquia (Colombia).

**RESUMEN.** Se describen dos especies nuevas del género neotropical *Symbolanthus* (Gentianaceae: Helieae). *Symbolanthus pterocalyx* Struwe se caracteriza por las corollas verdes o amarillas, los tallos fuertemente alados, y por los lóbulos del cáliz largos, acuminados y con una quilla dorsal larga y delgada sobre cada lóbulo. La otra especie nueva, *Symbolanthus tetrapterus* Struwe, tiene también tallos fuertemente alados y las corolas varían desde verdes o blancas hasta rosadas o rojo-violetas, pero los lóbulos del cáliz son redondos y no quillados. Las dos especies son endémicas de áreas restringidas en los Andes occidentales de Colombia. *Symbolanthus tetrapterus* se ha registrado solamente en el Cerro del Torrá, saliente de la Cordillera Occidental en el departamento del Chocó (Colombia). *Symbolanthus pterocalyx* se encuentra en bosques nublados de elevaciones altas, subpáramos, y páramos cerca de Medellín, en el departamento de Antioquia (Colombia).

**Key words:** Colombia, Gentianaceae, Helieae, Neotropics, *Symbolanthus*.

*Symbolanthus* G. Don is one of the most colorful and large-flowered genera of tropical American Gentianaceae. It is a member of tribe Helieae, a group that also includes *Chelonanthus* (Grisebach) Gilg, *Irlbachia* Martius, *Macrocarpaea* (Grisebach) Gilg, and *Tachia* Aublet (Struwe et al., 2002). *Symbolanthus* has the broadly bilamellate stigmas, curved stamens, pollen in tetrads, slightly zygomorphic flowers, and woody habit that are characteristic of this tribe. Its position in the Helieae is also supported by molecular data from several sources.

The plants of *Symbolanthus* are shrubby, sometimes small trees, and less often herbaceous. The flowers are 4–10 cm long, and two main types of corollas occur in the genus. The first type are salver-shaped and brightly pink, red, or purple corollas, often with white nectar guides on the lobes. The second type is more broadly shaped, with corollas that are basically white, yellow, to green. In most recent Andean floristic treatments one polymorphic species, *Symbolanthus calygonus* (Ruiz & Pavón) Grisebach, has been recognized (e.g., Montúfar, 2000; Pringle, 1995). During the last decades, dozens of previously described species (e.g., Grisebach, 1849; Gilg, 1906) have been recognized as synonyms under *Symbolanthus calygonus* following an unpublished revision by Noor van Heusden (Utrecht University). For her revision, she annotated all investigated *Symbolanthus* herbarium material with the name *Symbolanthus calygonus* (except for two highly distinct and narrowly endemic species). In herbaria and Andean floras, this view has been followed until now. Such a broadly circumscribed *Symbolanthus calygonus* included widely diverse calyx and corolla morphology traits. Immediately apparent is the corolla color, which in *Symbolanthus calygonus* sensu lato varies from deep magenta and red through pink to white, yellow, and green. Using this broad circumscription, *Symbolanthus calygonus* also had a distribution that covered all of the Andes from Bolivia in the south to Costa Rica in the north.



Van Heusden included the handful of *Symbolanthus* species of the Guayana Highlands in her broadly circumscribed species concept, but this view has never been followed in floristic works of that area (cf. Maguire & Boom, 1989; Struwe et al., 1999). Similarly, the Central American material has been consistently treated as a distinct species, e.g., *Symbolanthus pulcherrimus* Gilg (Standley, 1938; Elias & Robyns, 1975).

An ongoing revision of *Symbolanthus* by the author reveals that *Symbolanthus calygonus* is a species that is restricted to the Huánuco region in Peru and is characterized by having a thick “hump-like” dorsal keel on each calyx lobe. This suggests that many Andean species face resurrection, e.g., *Symbolanthus daturoides* (Grisebach ex Hooker) Gilg, *S. magnificus* Gilg, and *S. vasculosus* (Grisebach) Gilg, all of which have distinct morphological characters that can be used for field recognition. These investigations also indicate several species remaining to be described, especially from Bolivia and Peru. The number of species estimated in *Symbolanthus* totals at least 30, including two species of the genus *Wurdackanthus* Maguire, which is now synonymized under *Symbolanthus* (Gould & Struwe, in prep.; Struwe & Gould, in prep.).

This paper describes two new species from Colombia that are distinctly different morphologically from *Symbolanthus calygonus*. Significantly, these more narrowly circumscribed species not only differ in leaf and floral morphologies from *Symbolanthus calygonus* sensu stricto, but the color scheme of the corolla is also more consistent within each species (i.e., each species has either the red-pink scheme or the white-yellow-green scheme). Some individuals have a mixture of corolla colors, such as a white tube on a red corolla or a pink tinge on a white corolla. As discussed below, *Symbolanthus tetrapterus* is exceptional because it has corollas varying in color from red-purple, through pink, to white and green. In contrast, *Symbolanthus pterocalyx* has a light green to yellow corolla (rarely pale pink or with pink markings).

The two new species described here have in common strongly quadrangular and 4-winged stems. In *Symbolanthus tetrapterus*, the calyx lobes are acute and non-alate. *Symbolanthus pterocalyx* differs in having long-acuminate calyx lobes with a long and thin hyaline keel, traits that are unique to this latter species. Several non-winged species of *Symbolanthus* are previously known from Colombia and are currently being revised (Struwe, in prep.).

## MATERIAL AND METHODS

Herbarium material from HUA, K, MO, NY, U, and US was studied. Selected flowers from herbarium material were rehydrated in a solution of 70% ethanol, glycerol, and 5% Aerosol OT (9:1:1) for at least 24 hours.

## TAXONOMIC TREATMENT

### *Symbolanthus pterocalyx* Struwe, sp. nov.

TYPE: Colombia. Antioquia: Santa Elena, 1500–2000 m, shrub 15 ft., fl. pale yellow-green, 1 Jan. 1930, W. A. Archer 1287 (holotype, NY; isotypes, K, US). Figure 1.

Haec species *Symbolantho calygono* similis, sed ab ea caulibus manifeste alatis, lobis calycis longioribus longe-apiculatis manifeste alatis, tubo corollae calyce 1.0–1.25-plo longiore, et corollis albis, flavis vel viridis differt.

*Shrub*, branched, 0.6–4 m tall. *Branches* quadrangular, with interpetiolar lines; flowering stems 3–11 mm diam., internodes 1.2–4.8 cm long, winged; wing 1–3 mm wide. *Leaves* widely elliptic, (1.5–)2.0–2.5× longer than wide, broadest at the middle to slightly above, short- to long-petiolate, membranaceous when dry; lamina 5.5–16.2 × 1.6–6.5 cm; leaf apex acute to apiculate; leaf margin flat; leaf base long-attenuate; venation visible, 2 prominent pairs of basally divergent secondary veins; petiole 0.5–1.5(–2.0) cm long. *Inflorescence* 1- to 4(to 9)-flowered; subtending bracts and bracteoles linear to narrowly triangular, acute to acuminate, with dorsal keel, 9–12 × 2–3 mm at base; pedicel 26–42 mm long at anthesis, upper part of pedicel often keeled or 5-angular by decurrent calyx wings, pedicel 2–4 mm diam., transition from pedicel to flower gradual; flowers erect at anthesis. *Calyx* divided to ca. 0.8 of its length, at anthesis (2.6–)3.2–5.0 × (1.5–)2.0–2.9 cm; lobes narrowly ovate, (2.3–)2.8–4.0 × 1.1–1.7 cm, erect, but not tightly appressed to the corolla base, with a large, long, thin, often hyaline keel, 3–5 mm high, usually decurrent into the peduncle; apex long-apiculate (rarely acute); margin broadly hyaline; colleters (fingershaped, multicellular glands) present on large area on the inside of the base of each calyx lobe. *Corolla* broadly funnel-shaped, slightly zygomorphic with two lower lobes recurved, (5.0–)5.5–6.8(–7.8) cm long, basic color greenish white, pale yellow, yellow, to green (rarely pale pink), tube externally sometimes with reddish or pink lines, thin when dry; tube broadly widened toward mouth, straight, 1.0–1.25× longer than calyx, 3.4–5.0 cm long, 0.8–1.5 cm wide below insertion of stamens,



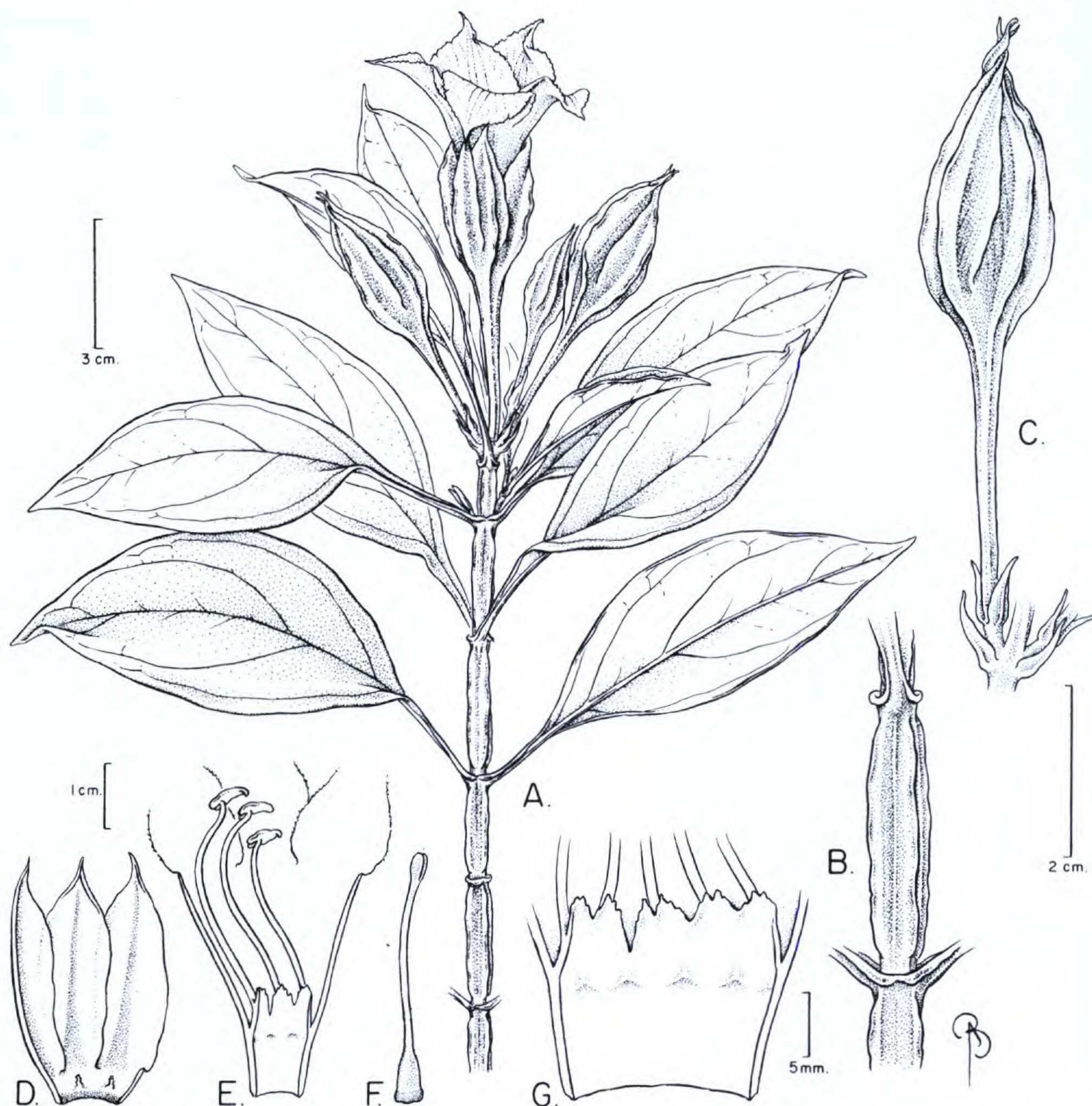


Figure 1. *Symbolanthus pterocalyx* Struwe (Archer 1287, K holotype, NY isotype: A–C; Zarucchi & Cárdenas 4322, NY paratype: D–G). —A. Habit of flowering stem. —B. Close-up of winged stem and interpertiole lines. —C. Flower bud showing calyx lobes with dorsal ridges decurrent onto the pedicel and comparatively large, linear bracts. —D. Opened calyx with colleters (glands) on internal surface. —E. Opened corolla (partial) with stamens and corona. —F. Gynoecium with glandular disk at base of ovary. —G. Inside of corolla tube with corona and base of filaments.

(1.8–)2.6–3.0 cm wide at mouth; lobes broadly ovate,  $2.0\text{--}3.0 \times 2.3\text{--}2.8$  cm, (1.0–)1.2–1.5 $\times$  longer than wide, spreading to slightly reflexed at anthesis, apex abruptly (long-)apiculate; corolla apex in bud tapering. *Stamens* inserted ca. 7–15 mm from the base of the corolla; corona well-developed, ca. 10 mm tall, as a coronate ring with 5 plicae, basally fused with filaments, free part ca. 5–6 mm tall, with small pockets behind corona, plicae rectangular and  $5\text{--}6 \times$  ca. 4 mm, upper edge fimbriate; filaments inserted into anther at ca.  $1/3\text{--}1/4$  from base of anther; anthers white to cream (young), brown (older), ca. 6–9 mm long. *Ovary* ca. 6–7 mm long; style 28–35 mm long; stigma lobes oblong, green to white, 3–4 mm long. *Fruit* a fleshy-walled

capsule, erect (rarely slightly nodding), broadly elliptic,  $2.4\text{--}3.1 \times 1.4\text{--}2.1$  mm, same length or shorter than calyx, green, dehiscent, persistent basal part of style 8–23 mm long; calyx lobes 26–50 mm long in fruit; seeds angular, brown, ca. 1 mm.

*Vernacular names.* Suspiro (Lehmann 5449), Tabaquillo pequeño (Giraldo et al. 1399).

*Phenology.* Flowering specimens have been collected in all months of the year except October and December; fruiting specimens have been found during January to April and August to October.

*Habitat and distribution.* *Symbolanthus pterocalyx* only occurs in high-altitude cloud forests, subpáramo, and páramo habitats in the province of



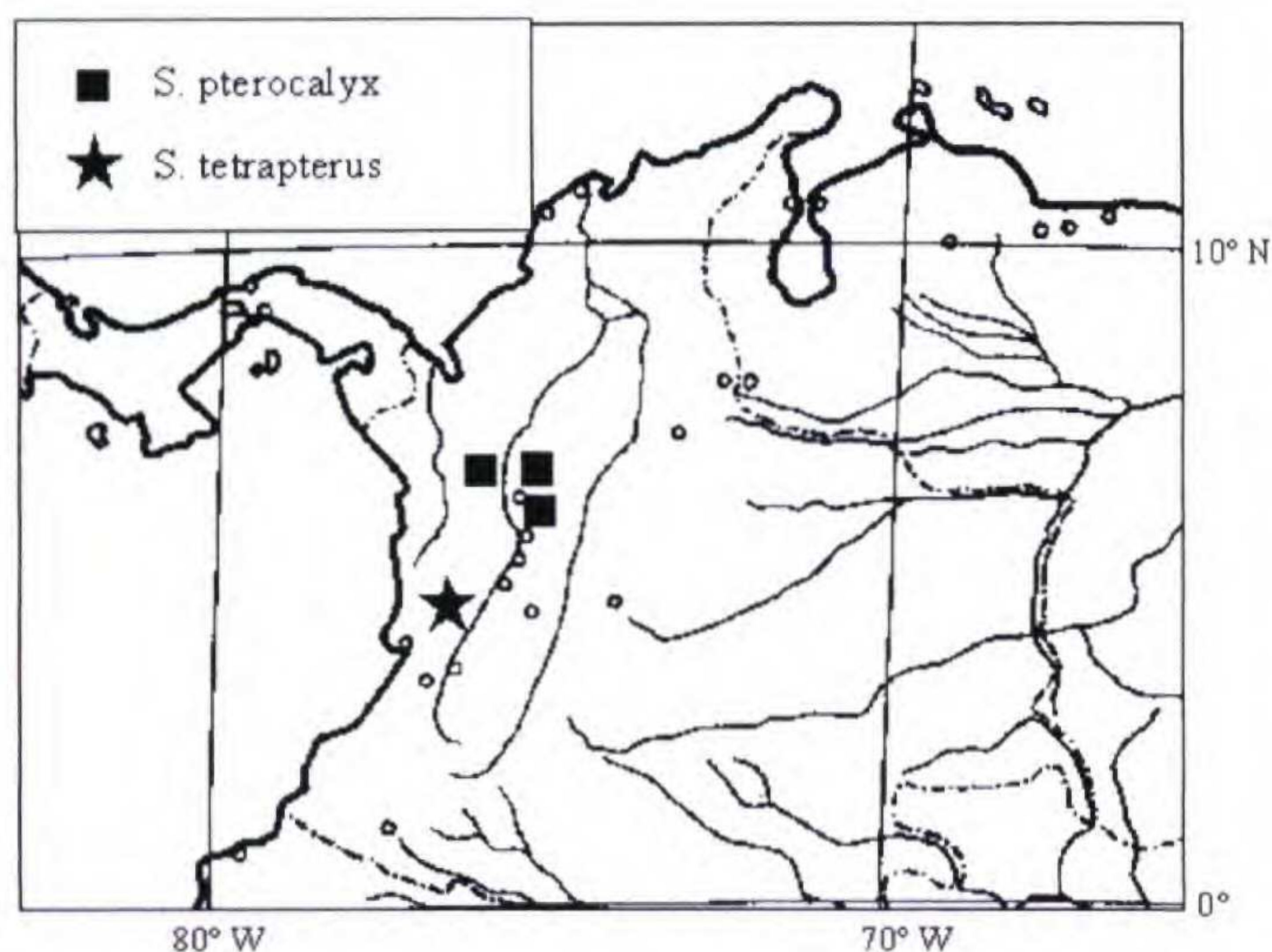


Figure 2. Distribution map for *Symbolanthus pterocalyx* and *S. tetraapterus*.

Antioquia, Colombia (Fig. 2). It has been found at Cerro del Padre Amaya, Páramo “El Morro,” Páramo Sabanazo, Cerro San Félix, and Cerro Marcon in the Santa Helena area at altitudes between 1500 and 3200 m. Several collectors noted on herbarium labels that this is a common plant in these areas. It also grows in disturbed areas and is noted to recover degraded soils (vidi *Giraldo et al. 1399*: “USO: Pro[te]ctor de fuentes de agua, recuperador de suelos”).

**Etymology.** This species is named *pterocalyx* (= winged calyx) after its prominent wings on the calyx.

**Paratypes.** COLOMBIA. **Antioquia:** Mun. Bello, corregimiento de San Félix, 5 June 1989, *Echeverri & Contreras 86* (HUA); Corregimiento San Félix (Torres de Telecomunicaciones), 22 May 1991, *Fonnegra & Curso Taxonomía Vegetal 3733* (HUA, U); Cerro San Félix, 11 Mar. 1992, *Fonnegra & Grupo Tax. Plan. Vasc. I Sem/92 3979* (HUA); Mun. de Caldas, Vereda La Corrala, FINCA “La Zarza,” 28 Apr. 1986, *de Escobar & Giraldo 6649* (HUA); Mun. de Belmira, Páramo “El Morro,” Proyecto Reserva Natural “El Páramo de Belmira,” 22 Apr. 1993, *Fonnegra & Tuberquia 4637* (HUA, MO, U); Páramo Sabanazo, Estación Ecológica “El Refugio,” 14 May 1996, *Fonnegra et al. 5984* (HUA); Mun. Buriticá, Corregimiento El Guarco, Bosque Andino, 12 Mar. 2000, *Molina et al. 431* (HUA); Mun. de Envigado, borde de carretera y divorcio de aguas, 16 Apr. 1996, *Correa et al. 334* (HUA, JAUM not seen; det. here as cf. *pterocalyx*), 18 Apr. 1996, *Correa et al. 515* (HUA, JAUM not seen); recorrido límite Envigado, Caldas y El Retiro hacia el Oriente siguiendo el divorcio de aguas, 25 Apr. 1996, *Correa et al. 712* (HUA, JAUM not seen); Mun. Frontino, Corregimiento Nutibara, Vereda Alto de Cuevas, Quebrada del Oso, 23 Apr. 1991, *Fonnegra & Curso Taxonomía Vegetal 3536* (HUA, U); cuenca alta del Río Cuevas, 13 Jan. 1987, *Sánchez et al. 894* (HUA, MEDEL not seen), 13 July 1987, *Sánchez et al. 1366* (HUA, MEDEL not seen); Mun. de La Estrella, vereda El Romeral, sitio La Laguna, 17 Aug. 1992, *Giraldo-Cañas et al. 1085* (HUA); Mun. La Unión, Corregimiento San Miguel, carretera La Unión-Sonsón, borde de cañada, cerca al Río Piedras, 5 July

1987, *Marulanda et al. 304* (HUA); Mun. Medellín, Bquerón, Cerro del Padre Amaya, Feb. 1984, *Agudelo & Betancur 32* (HUA); Corregimiento San Cristobal, Ver. La Palma, 1 Apr. 1997, *Giraldo et al. 1399* (HUA, JAUM not seen); bosque de subparámo, antena de INRAVISION, 2 Sep. 1981, *Hoyos et al. 112* (HUA); ca. 19 km W of Medellín (rd. to Antioquia), cloud forests 5–10 km from highway along road to TV towers, 25 Mar. 1979, *Luteyn & Lebrón-Luteyn 7081* (HUA, NY); Militar, 15 May 1982, *Moreno & Buitrago 21* (HUA), 4 Aug. 1979, *Palacios et al. 85* (HUA); 11 km from Medellín–Santa Fé de Antioquia highway on road to summit, 18 Mar. 1987, *Zarucchi & Madrigal 4853* (HUA, MO, U); along road to Cerro del Padre Amaya, 10 km from Medellín–Santa Fé de Antioquia road, 15 Sep. 1987, *Zarucchi & Brant 5341* (HUA, MO), 4 Jan. 1969, *Uribe Uribe 6225* (US); Mun. de Santa Rosa, carretera hacia Aragón 5 km, 2 Oct. 1982, *Curso Ecología Vegetal, Universidad de Antioquia s.n.* (HUA); Mun. de Yarumal, Wächst in dichten laubwäldern um Yarumal, Nov. 1891, *Lehmann 5449* (K); N of Yarumal on road to Cerro Marconi (telecommunication towers for town), S slope near peak, 29 Nov. 1986, *Zarucchi & Cárdenas 4322* (HUA, MO, NY, U); unknown municipality, Santa Helena, forest bond., 9 Jan. 1880, *Kalbreiter 1304* (K); Rionegro, 24 Jan. 1992, *Vargas 790* (HUA).

***Symbolanthus tetraapterus* Struwe, sp. nov.**

**TYPE:** Colombia. Chocó: Mun. San José del Palmar, Cerro del Torrá, cumbre del Torrá Grande, 2770 m, 13 Jan. 1984, *F. A. Silverstone-Sopkin, N. Paz, A. Duque & H. Bayona 1803* (holotype, U; isotypes, CUV, MO). Figure 3.

Haec species *Symbolantho calygono* similis, sed ab ea caulibus manifeste alatis, foliis obovatis vel obovatis-oblongis sessilis (raro subsessilis), et calycibus non alatis differt.

**Shrub**, branched, 1–4 m tall. **Branches** quadrangular, with interpetiolar lines; flowering stems 5–8 mm diam.; internodes 11–39 mm long, winged, wing broader toward upper part of each internode, often with a wavy to undulating edge; wing (0.5–) 1.5–3.0 mm wide. **Leaves** obovate or obovate-oblong, 2.0–2.5× longer than wide, broadest above middle, sessile (seldom subsessile), membranaceous to slightly coriaceous when dry; lamina 3.2–12.9 × 1.3–6.3 cm; leaf apex rounding to acute apex; leaf margin flat; leaf base cuneate; venation visible, 2 pairs of basally divergent secondary veins; petiole 0(–5) mm long. **Inflorescence** 1- to 4-flowered; subtending bracts and bracteoles triangular, acute, membranaceous, 2–3 mm long, ca. 3 mm wide at base; pedicel 18–29 mm long at anthesis, terete, 2–3 mm diam., transition from pedicel to flower gradual; flowers erect at anthesis. **Calyx** divided to ca. 0.9 of its length, at anthesis 2.2–2.8 × 1.3–1.5 cm; lobes narrowly ovate, 1.3–2.5 × 0.8–1.0 cm, appressed (but not tightly) to the corolla base, without dorsal keel, but dorsally thick-



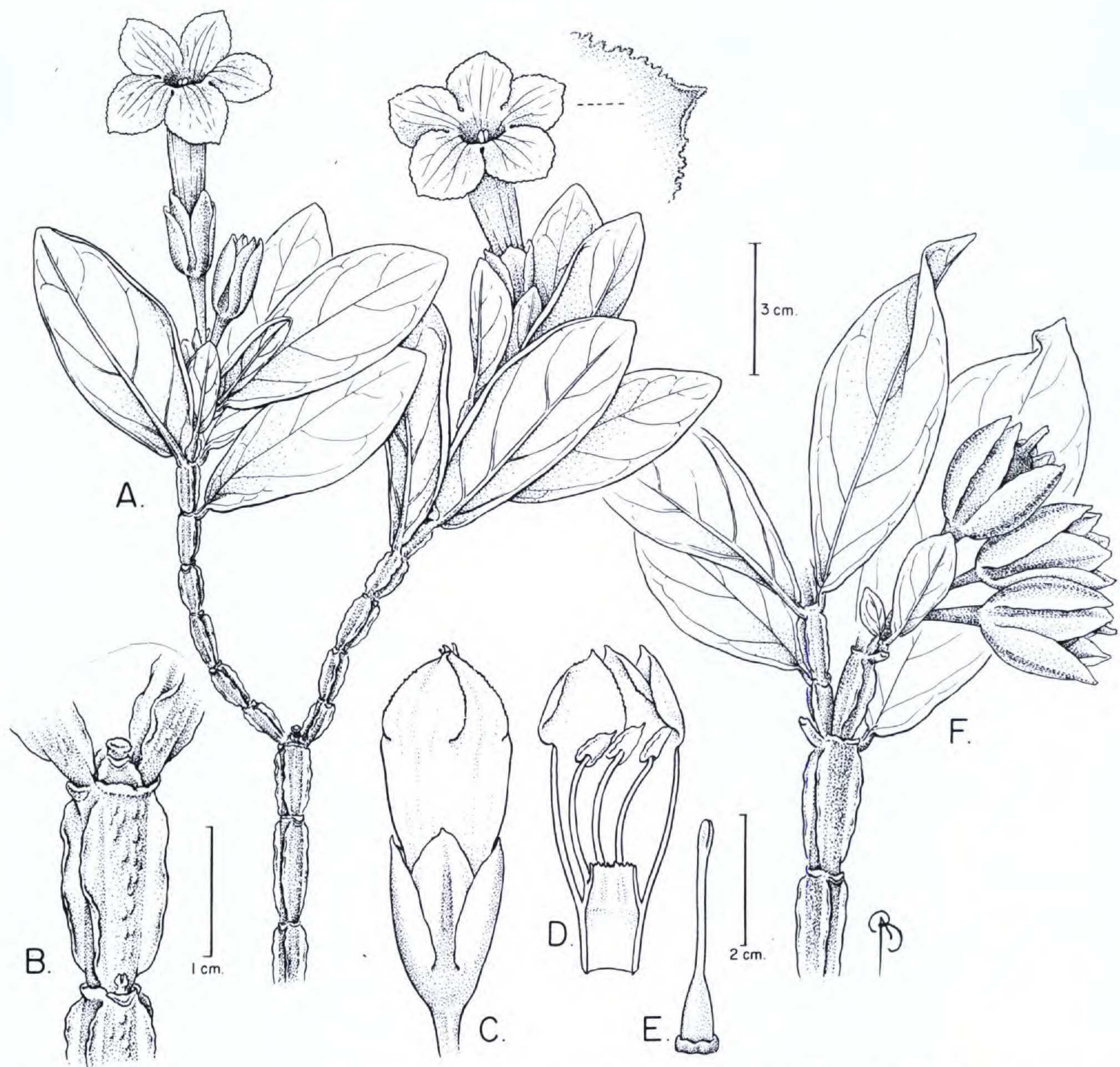


Figure 3. *Symbolanthus tetrapterus* Struwe (Silverstone-Sopkin et al. 1803, MO isotype: A, B, F; Silverstone-Sopkin et al. 4140, U paratype: C–E). —A. Habit of flowering stem, with close-up of erose corolla lobe apex at right. —B. Close-up of winged stem and interpetiolar lines. —C. Flower before anthesis showing non-keeled calyx lobes. —D. Inside of corolla with corona and anthers. —E. Gynoecium (note glandular base of ovary). —F. Close-up of branch with young fruits.

ened; apex acute, mucronate; margin very broadly hyaline; colleters present as a glandular colleter area on the inside of the base of each calyx lobe. *Corolla* narrowly funnel-shaped, actinomorphic, 6.2–6.8 cm long, basic color white, green, pink (less often dark pink to red-purple), sometimes also the corolla tube white internally, green externally, and corolla lobes showy dark pink (vidi Silverstone-Sopkin et al. 4140), thin when dry; tube cylindric to slightly widened toward mouth, straight, 2.0–2.5× longer than calyx, 4.8–5.2 cm long, ca. 0.7 cm wide below insertion of stamens, 1.2–2.2 cm wide at mouth; lobes broadly ovate, 1.5–2.0 × 1.5–2.0 cm, 1.0–1.3× times longer than wide, erect to spreading at anthesis, apex obtuse, with a small apiculate tip; corolla apex in bud tapering. *Stamens* inserted ca. 10–15 mm from the base of the corolla;

corona well-developed, ca. 10 mm tall, as a coronate ring with fused upper edge, with small pockets between corona and corolla, fused with filaments for 5 mm, upper portion (5–6 mm tall) free from the filaments, corona edge uneven, papillate; filaments inserted into anther ca. 1/4 from base of anther; anthers white, 6–7 mm long. *Ovary* ca. 6–7 mm long; style ca. 2 cm long; stigma lobes oblong, ca. 3 mm long. *Fruit* a fleshy-walled capsule, nodding, globose to elliptic, 2.0–3.4 × 1.8–2.4 cm wide, same length as calyx, green, probably dehiscent, persistent basal part of style 2–6(–22) mm long; calyx lobes 2.1–3.0 cm long in fruit; seeds not seen.

*Phenology.* Flowering and fruiting specimens have been collected in January and August.



Table 1. Comparison of the two new species *Symbolanthus pterocalyx* and *S. tetrapterus* with *S. calygonus*.

	<i>S. calygonus</i>	<i>S. pterocalyx</i>	<i>S. tetrapterus</i>
Wings on stem	not or barely winged	prominently winged	prominently winged
Leaf shape	elliptic-lanceolate	widely elliptic	obovate to obovate-oblong
Leaves petiolate vs. sessile	distinctly petiolate leaves	distinctly petiolate leaves	sessile (rarely subsessile)
Leaf base	cuneate	cuneate	strongly attenuate
Bract length	4–10 mm	10–12 mm	2–3 mm
Calyx lobe length	1.5–2.4 cm	2.8–4.0 cm	1.3–2.5 cm
Calyx lobe apex	obtuse to slightly acute	long-apiculate	acute, mucronate
Calyx wings	short “hump-like” keel	long thin wing on the back of each calyx lobe, often decurrent	wing absent
Corolla tube length vs. calyx length	2–3× longer	1.0–1.25× longer	2.0–2.5× longer
Corolla color	pink to red	white, yellow, to green (rarely pale pink)	green, white, pink, or red-violet corollas
Distribution	Peru: Huánuco	Colombia: Antioquia	Colombia: Chocó

*Habitat and distribution.* *Symbolanthus tetrapterus* is known only from Cerro del Torrá in southern Chocó in Colombia (Fig. 2). It grows in several habitats on this mountain at ca. 1900–2800 m altitude, from disturbed shrubby vegetation, primary forests, to open páramo vegetation summit dominated by *Neurolepis* Meissner, *Paepalanthus* Kunth, *Blechnum* P. Browne, and Rubiaceae and Melastomataceae shrubs and very few dwarf trees, but devoid of *Espeletia* Mutis ex Bonpland (Silverstone-Sopkin & Ramos-Pérez, 1995). This type of páramo-like vegetation usually occurs at a higher altitude in the Andes, and its occurrence on Cerro del Torrá is probably due to wind exposure (Silverstone-Sopkin & Ramos-Pérez, 1995).

*Etymology.* This species epithet is derived from *tetrapterus* (or 4 wings) after its four prominent and decurrent wings along the stems.

*Paratypes.* COLOMBIA. **Chocó:** Municipio San José del Palmar, Cerro del Torrá, vertiente nordeste, 8 Aug. 1982, *Silverstone-Sopkin 1260* (CUVC, MO); cumbre, 8 Aug. 1982, *Silverstone-Sopkin 1268* (CUVC, MO); vertiente nororiental, arriba del helipuerto, 6 Jan. 1984, *Silverstone-Sopkin et al. 1587* (CUVC, MO, U); cumbre del Torrá Grande, 13 Jan. 1984, *Silverstone-Sopkin et al. 1804* (CUVC, MO); vertiente oriental, helipuerto, 6 Aug. 1988, *Silverstone-Sopkin et al. 4140* (CUVC 2 sheets, NY, U); filo de cumbre, 15 Aug. 1988, *Silverstone-Sopkin et al. 4421* (CUVC, U), 15 Aug. 1988, *Silverstone-Sopkin et al. 4422* (CUVC, U), 21 Aug. 1988, *Silverstone-Sopkin et al. 4664* (CUVC, U).

DISCUSSION

*Symbolanthus pterocalyx* differs from *S. calygonus* in several notable characters (Table 1). These

include prominently winged stems (vs. not or barely winged stems), longer bracts (10–12 mm vs. 4–10 mm), longer and long-apiculate calyx lobes (28–40 mm vs. 15–24 mm and obtuse to slightly acute) with a long thin wing on the back of each calyx lobe (vs. a short “hump-like” keel), corolla tube 1.0–1.25 times longer than calyx (vs. 2–3 times), and white, yellow, to green corollas (vs. pink to red). Only one known collection of *Symbolanthus pterocalyx* has corollas that are recorded as pale pink (*Zarucchi & Cárdenas 4322*) as opposed to yellow and green, so corollas of the pink-red color scheme are very uncommon in this species. In a few specimens the calyx keels are not strongly developed toward the apex of the calyx lobes, but the keels are always present at the very upper portion of the pedicel to the base of the calyx lobes. Usually the same specimens that have less well-developed wings on the stems will always have the long and acuminate calyx lobes (at least somewhat keeled) and greenish yellowish corollas (e.g., *Fonnegra et al. 5984*). The calyx wings are often decurrent as ridges down onto the pedicel (e.g., in *Marulanda et al. 304*, where the wings from the two outer calyx lobes reach down to the base of the pedicel and cause it to be distinctly flattened in cross section).

Gentians are rarely eaten by insects and other herbivores, but several collections of *Symbolanthus pterocalyx* have circular to 5 mm large holes in their leaves (e.g., *Marulanda et al. 304*, *Vargas 790*). Nearly all gentians contain large amounts of extremely bitter chemical compounds (seco-iri-



doids; Samuelsson, 1992: 153; Jensen & Shripsema, 2002), but it is not known if these reduce herbivory. Furthermore, according to herbarium label information from *Agudelo & Betancur* 32, in *Symbolanthus pterocalyx*, wasps (Vespidae) are associated with the hollow stems and beetles (Coleoptera) are found in the (presumably floral) receptacles. Hummingbirds have been recorded as visitors to a *Symbolanthus tetrapteris* plant with white to green-colored corollas (Silverstone-Sopkin *et al.* 4140).

*Symbolanthus tetrapteris* differs from *S. calygonus* in its prominently winged stems (vs. not or barely winged stems), obovate to obovate-oblong and sessile (rarely subsessile) leaves (vs. elliptic-lanceolate and distinctly petiolate leaves) with a strongly attenuate base (vs. cuneate), shorter bracts (2–3 mm vs. 4–10 mm), non-alate calyces (vs. a dorsal keel on each calyx lobe), and green, white, pink, or red-violet corollas (vs. always pink to red; Table 1).

The mountain Cerro del Torrá is an isolated outlier west of the Cordillera Occidental of the Andes and reaches about 2800 m elevation. It is the only known locality of *Symbolanthus tetrapteris*, and over 25 other endemic plant species have been described from this mountain (in Ericaceae, Melastomataceae, Orchidaceae, and Solanaceae). In fact, of the three gentians so far found on Cerro del Torrá, possibly two are endemic to this mountain (*Symbolanthus tetrapteris* and *Macrocarpaea* sp. nov., J. R. Grant, unpublished). The floristic study of Cerro del Torrá by Silverstone-Sopkin and Ramos-Pérez (1995) showed an overwhelming floristic affinity between Cerro del Torrá and the Cordillera Occidental. This result suggested that this mountain is not a phytogeographical entity distinct from the Cordillera Occidental.

The phylogenetic relationships of *Symbolanthus pterocalyx* and *S. tetrapteris* are uncertain at present, and the closest relatives to each cannot be discerned based on simple comparison of morphological traits. Molecular studies including other species of *Symbolanthus* have shown that sequence variation in the fast-evolving 5S-NTS nrDNA region is very low and does not resolve species relationships in Andean *Symbolanthus* very well (Gould & Struwe, in prep.). However, molecular data suggest that there is support for the hypothesis that green-white vs. red-pink-flowered species do not constitute major monophyletic groupings. These two new species are not very similar to each other apart from their winged stems, and other morphological features do not suggest a close relationship to each other. *Symbolanthus pterocalyx* from Antioquia shows more similarities with the eastern Andean

species *S. vasculosus* in its long-petiolate leaves and large, campanulate corolla with wide corolla lobes, inferring possible bat pollination. The more southern *Symbolanthus tetrapteris* has sessile leaves and salver-shaped flowers indicating hummingbirds as possible pollinators. Both species have winged stems but this character occurs in other species as well, e.g., *Symbolanthus vasculosus*. The presence of winged stems in these species is probably due to parallel evolution of this trait in geographically separated populations, rather than a result of common ancestry. Further phylogenetic studies are needed, and until suitable DNA markers become available, hypotheses about species relationships will have to be based on selected morphological characteristics alone.

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